

PROJECT TITLE : SPOTLESS
PERIOD COVERED : JUNE 1980
WRITTEN BY : F. MOSER

OBJECTIVE

To produce prototype cigarettes which are denitrated, but otherwise correspond to commercial cigarettes. Two series of prototypes have been selected for the project, one representing American blend cigarettes and the other aircured type cigarettes. The whole Spotless project includes 16 different cigarette brands (7 for the aircured type and none for the American blend type) all cigarettes are ready.

EXPERIMENTAL WORK

The tobaccos for the project correspond to BRD Atlantic 8331 for the air-cured type and to MLF Atlantic 8222 for the blend type cigarettes.

Although eventually the tobaccos for the cigarettes will be submitted for a true denitration procedure in which the water solubles are not lost, as a first step it was decided to use aqueous extraction, to discard the extract and to compensate only for the loss of potassium ions by adding potassium citrate. In fact, as can be seen from the figures in table 1, the loss has not quite been made up for, due, probably, to some loss of potassium citrate in the flavouring cylinder during spraying.

The blend components for each type of cigarette were extracted separately in cut rag form as well as in the ready blended form. This was chosen simply as control measure.

The extraction was carried out by the Process Development Group in the Pilot Plant using a rotary segmented extractor and water of 80° C.

The following listing recalls the coding allocated to the individual experimental cigarettes:

First sign : Ø (zero) for the year 1980

A : for air-cured type (red label)

B : for blend type (black label)

SPO : for denitrated

1 ØS-A-TOT	} red label	1 ØS-B-TOT	} black label
2 ØS-A-TOT/SPO		2 ØS-B-TOT/SPO	
3 ØS-A-MD		3 ØS-B-FC	
4 ØS-A-CH		4 ØS-B-BU	
5 ØS-A-MD/SPO		5 ØS-B-OR	
6 ØS-A-CH/SPO		6 ØS-B-FC/SPO	
7 ØS-A/SPO/SPO		7 ØS-B-BU/SPO	
	8 ØS-B-OR/SPO		
	9 ØS/SPO/SPO/SPO		

The TLA results for the cigarettes are listed in tables 2-8. Comparison is in certain cases difficult because of unsuitable cigarette RTD's. However, some of the results are startling. In table 2 the value for TPM of the non-extracted control cigarette 1 ØS-A-TOT is 16.8, for the cigarette of bulk extracted tobaccos 2 ØS-A-TOT/SPO 16.1 and for the cigarette with individually extracted blend components 7 ØS-A-SPO/SPO 14.8. One might have expected a larger influence of nitrate removal on TPM. Perhaps the nitrate removal is being compensated by the associated removal of other solubles. In the blend version, table 5, there is a TPM reduction but, of course, the puff number is reduced.

Obviously, a number of speculations spring to mind when pondering over these tables but they require some experimental follow-up.

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TABLE 1

Project Spotless: Washing - Efficiency on $N-NO_3$ and K

Sample	% $N-NO_3$	% Efficiency	% K	% Efficiency	% K after addition of Tri-K-Citrate
1 $\phi S-A-TOT$	0.275	89.1	4.85	93.2	3.57
2 $\phi S-A-TOT/SPO$	0.03		0.33		
3 $\phi S-A-MD$	0.25	92	4.79	93.1	3.54
5 $\phi S-A-MD/SPO$	0.02		0.33		
4 $\phi S-A-CH$	0.30	93.3	4.65	93.8	3.85
6 $\phi S-A-CH/SPO$	0.02		0.29		
1 $\phi S-B-TOT$	0.35	95.7	3.75	91.5	3.06
2 $\phi S-B-TOT/SPO$	0.015		0.32		
3 $\phi S-B-FC$	0.03	76.7	3.08	80.8	2.80
6 $\phi S-B-FC/SPO$	0.007		0.59		
4 $\phi S-B-BU$	0.46	89.1	4.99	94.6	4.27
7 $\phi S-B-BU/SPO$	0.05		0.27		
5 $\phi S-B-OR$	0.03	93.3	2.23	85.2	1.62
8 $\phi S-B-OR/SPO$	0.002		0.33		

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TABLE 4

Project: Spotless		4 ϕ S-A-CH	6 ϕ S-A-CH/SPO	
<u>Filler</u>				
Alcaloids tot.	%	0.71	0	
Reducing sugars	%	0	0	
Nitrate Nitrogen	%	0.33	0	
Ammonia Nitrogen	%	0.74	0	
Kjeldahl Nitrogen	%	3.79		
Total Nitrogen	%	4.30		
<u>Fiber</u>				
SN	mg/F	0.67	0.16	
HCN	μ g/F	12.9	3.9	
Aed.	mg/F	0.59	0.50	
<u>Smoke</u>				
CO	mg/Cig.	21.5	17.7	
NO	mg/Cig.	0.36	0.04	
TPM	mg/Cig.	21.9	15.3	
SN	mg/Cig.	0.62	0.13	
Puff	Number	7.2	7.4	
HCN	μ g/Cig.	146	124	
Aed	mg/Cig.	1.25	1.67	
ISH	%	48	27	

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Project: Spotless	1 ϕ s-B-TOT	2 ϕ s-B-TOT/SPO	3 ϕ s-B/SPO/SPO
Filter			
Alcohols tot. %	1.96	0.18	0.13
Reducing sugars %	6.7	0	0
Nitrate Nitrogen %	0.25	0	0
Ammonia Nitrogen %	0.31	0.05	0
Ketodide Nitrogen %	3.22		
Total Nitrogen %	3.47		
Filter			
SN mg/F	1.06	0.13	0.12
HCN μ g/F	58	28	32
Acd. mg/F	0.48	0.52	0.55
Smoke			
CO mg/cig.	16.1	15.3	15.7
NO mg/cig.	0.31	0.03	0.03
TPM mg/cig.	19.1	13.2	15.4
SN mg/cig.	1.31	0.12	0.14
Puff Number	8.0	6.4	6.9
HCN μ g/cig.	2.43	5.1	5.1
Acd. mg/cig.	1.41	1.40	1.55
SN %	38	34	36

Project: Spotless		3 ϕ s - B - FC	6 ϕ s - B - FC/SPO	
<u>Filler</u>				
Alcaloids tot.	%	2.90	0.30	
Reducing sugars	%	9.5	0	
Nitrate Nitrogen	%	0.08	0	
Ammonia Nitrogen	%	0.08	0	
Kjeldahl Nitrogen	%	2.88		
Total Nitrogen	%	2.96		
<u>Fieks</u>				
SN	mg / F	1.31	0.32	
HCN	μ g / F	6.8	6.7	
Aed.	mg / F	0.69	0.76	
<u>Smoke</u>				
CO	mg / Cig.	16.5	15.9	
NO	mg / Cig.	0.10	0.03	
TPM	mg / Cig.	22.4	22.0	
SN	mg / Cig.	1.86	0.30	
Puff	Number	8.3	7.1	
HCN	μ g / Cig.	244	149	
Aed.	mg / Cig.	1.56	1.76	
ISH	%	34	33	

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Project: Spotless	4 ϕ s - B-BU	7 ϕ s - B-BU/spo
Filter		
Alcalds tot. %	1.82	0.06
Reducing sugars %	1.4	0
Nitrate Nitrogen %	0.47	0
Ammonia Nitrogen %	0.56	0
Kjeldahl Nitrogen %	3.96	
Total Nitrogen %	4.43	
Filter		
SN mg/F	1.13	0.16
HCN μ g/F	73	24
Acid. mg/F	0.45	0.48
Smoke		
CO mg/cig.	18.7	13.4
NO mg/cig.	0.47	0.02
TPM mg/cig.	16.4	10.1
SN mg/cig.	1.20	0.09
Partic. Number	7.7	6.3
HCN μ g/cig.	199	64
Acid. mg/cig.	1.27	1.37
154 %	40	28

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TABLE 8

Project: Spotless		5 ϕ s - B - OR	8 ϕ s - B - OR / SPO	
<u>Filler</u>				
Alcaloids tot.	%	0.96	0.11	
Reducing sugars	%	15.7	0	
Nitrate Nitrogen	%	0.04	0	
Ammonia Nitrogen	%	0.08	0	
Kjeldahl Nitrogen	%	2.16		
Total Nitrogen	%	2.20		
<u>Filler</u>				
SN	mg / F	0.72	0.15	
HCN	μ g / F	63	43	
Aed.	mg / F	0.80	0.73	
<u>Smoke</u>				
CO	mg / Cig.	17.2	14.7	
NO	mg / Cig.	0.12	0.04	
TPM	mg / Cig.	25.3	18.4	
SN	mg / Cig.	1.07	0.11	
Puff	Number	15.7	7.1	
HCN	μ g / Cig.	202	160	
Aed	mg / Cig.	1.54	1.62	
ISH	%	33	32	

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